Service and aftermarket solutions
Electrification products distribution solutions service
ABB's Electrification Products Distribution Solutions Service team are experts across a wide range of product and service offerings. They have the knowledge and experience to help solve problems and assist in meeting all your service needs, both on and offsite. With multiple service centers across North America, and our regionally dispersed Field Service Engineers, the ABB Service team is always nearby and ready to support your needs.
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Overview
ABB’s Electrification Products Distribution Solutions Service team are experts across a wide range of product and service offerings. They have the knowledge and experience to help solve problems and assist in meeting all your service needs, both on and offsite. With multiple service centers across North America, and our regionally dispersed Field Service Engineers, the ABB Service team is always nearby and ready to support your needs.

With over 100 years of experience in the design, development, manufacturing and service support of medium and low voltage switchgear, we have established a wealth of technical solutions to meet your specific electrical network reliability needs. We recognize that electrical equipment has different service needs depending on factors such as age, maintenance, application, and duty cycle.

ABB has one of the largest installed bases of any switchgear manufacturer in North America. We support our products through a comprehensive range of services that ensure optimum performance throughout the entire product life cycle.

ABB personnel are highly qualified and certified to perform the field services required to keep your electrical equipment operating properly and safely. ABB’s worldwide leadership and manufacturing excellence, in medium and low voltage products, allows ABB to provide a variety of aftermarket solutions and services for both conventional and nuclear safety related applications.

Our service portfolio starts with installation and commissioning and continues through the product life cycle to include decommissioning.

Products we support
ABB offers service on a comprehensive range of products for electrical distribution networks.

We supply parts and service for:
- Air insulated switchgear
- Outdoor switchgear
- Gas insulated switchgear
- Motor control centers
- Secondary switchgear, ring main units
- Compact substations
- Circuit breakers and contactors
- Load break switches and disconnectors
- Distribution protection and control
- Relay systems

In addition, we maintain archives containing complete technical information on a wide range of our heritage brand products. Over the years, ABB brands have included:
- ITE
- Gould
- Brown Boveri
- ABB
- SACE
- Calor EMAG
- ASEA

ABB is strongly committed to providing aftermarket service and support for all of these brands, including options to extend their life through retrofit and upgrade services to include the latest technology standards.
Our service solutions
Whatever your needs, we support our switchgear installations with a full service portfolio that covers every network application, from large to small. Each and every job, on or off-site, is accurately assessed, utilizing highly developed skills and technical tools to ensure the best outcome.

Our solutions take all factors into consideration, including technical, financial, environmental, and safety aspects. The result is a reliable and long lasting solution.

ABB has several long-established switchgear and component factories and a robust R & D infrastructure. Combined with our network of local service centers in North America, this enables us to provide the highest standard of product support from installation to end-of-life.

Regardless of the age of your switchgear, ABB can provide a solution.

Always one step ahead
Staying ahead means making the right decisions, at the right time, based on the right information. ABB aims to work as an active partner in your business.

We support our installed base through proactive service offerings that ensure high reliability, safety, and optimal performance of switchgear and components.
Start-up and maintenance services
Installation and commissioning

Correct installation and commissioning will ensure a high degree of operational reliability. To achieve a problem-free start-up, it is required that ABB installation and commissioning procedures are followed. The use of ABB service personnel ensures that the switchgear is installed and put into operation in a safe and correct way.

Installation services including:
• Foundation alignment check
• Supervision of cubical erection
• Supervision of transport section connections
• Supervision of incoming/outgoing cable connections
• Switchgear earthing check
• Insulation level testing
• Internal wiring check
• Internal serial communications analysis check
• Auxiliary voltage supply check

Testing and commissioning of switchgear
• Setting of device parameters for circuit breakers, motor starters and feeders
• Operation of circuit breakers, motor starters and feeders

Testing and commissioning of protection and control
• Verify the relay settings and the integrity of the system
• Trip checks to make sure the relays pass acceptance testing
• In-service tests can also be performed
• System wiring is verified against as-built drawings
• Documentation on findings, including test reports, is provided

Benefits
If ABB is managing switchgear installation and commissioning, your benefits are:
• Reliable switchgear from the first day of operation
• Lower risk for shut down
• Faster start-up
• Optimum life cycle performance
• Extended warranty
• Training for your operators, maintenance teams, and engineers

Besides installation and commissioning of switchgear, ABB also offers this service for:
• Circuit breaker retrofit
• Protection and control retrofit
• Safety upgrades
• Monitoring devices
Start-up and maintenance services

Training

ABB’s hands-on training programs educate customers on the proper maintenance and service of ABB electrical power equipment. These training programs are offered at both ABB and customer facilities.

A large selection of specialized training programs are available and training programs can be tailored to meet the specific needs of customers. The training programs are developed for operators, engineers, and technicians to become proficient in the application, installation, operation, maintenance, testing, and commissioning of ABB switchgear, circuit breakers, relays, and related components and upgrades.

**Power service training**

Power service training focuses on switchgear and circuit breakers and is available for both nuclear and non-nuclear applications.

Circuit breaker and switchgear training covers all product aspects. Training can also include proper disassembly methods for breakers, identifying components that need to be replaced, and re-assembly.

Standard training classes are available or customer-specific training can be developed according to customer requirements.

**Relay training**

ABB has comprehensive relay training programs for all relay types including electromechanical, solid state, and microprocessor relays.

Class participants receive instruction on everything about relays from calibration to troubleshooting techniques. ABB also has relay training programs that teach detailed protective relaying such as symmetrical components and fault analysis, and distribution and transmission protection, along with protection for many electric power component applications.

**Training programs cover:**

- Product orientation
- Application
- Installation
- Calibration
- Operation
- Inspection
- Maintenance
- Testing
- Commissioning
- Troubleshooting
- Safety
Start-up and maintenance services
Spares and consumables

Products supported
Original ABB spare parts are distinguished by quality, security, and high reliability. Original ABB spare parts have high lifetime expectancies and excellent equipment performance, making them the best economical choice.

Accurately defined manufacturer specifications, as well as comprehensive examinations and type testing, make sure that every ABB spare part complies with our high quality standards and the latest technical status.

ABB can supply spare parts, spare part kits, assemblies, and components for the following ABB and heritage brand products:
- Switchgear
- Indoor circuit breakers
- Outdoor circuit breakers
- Load break switches
- Disconnecter switches
- Contactors
- Protection and control relays
- Substation automation
- Reclosers
- Fuses

Why use authentic spare parts?
Using replacement parts purchased through third-party sources can be a recipe for catastrophic failure. Parts acquired through other sources have an unknown history that could put your plant’s electrical system at risk with substandard components.

Buying third-party manufactured parts could mean buying into more problems and added risk. Reverse engineering critical parts is common practice for some third-party vendors, engineering worn tolerances into a seemingly new product with substandard designs.

ABB’s warehouse maintains an extensive stock of new switchgear and breaker components to meet emergency needs for both nuclear safety related and conventional applications, with same day shipments available on many parts.

Only ABB spare parts comply with 10 CFR 50 Appendix B, 10 CFR Part 21, and NQA1 requirements, when applicable, for nuclear safety related equipment.

Example of a non-original spare part applied to a circuit breaker operating mechanism.

The following mistakes have been detected on the non-original part:

1. First tooth catches the linked mechanism earlier than needed
2. Tooth inclination angle is wider than maximum allowed tolerance
3. The surface is not properly treated to avoid the rusting process
Start-up and maintenance services

Maintenance

When looking at today’s maintenance strategies, preventive maintenance is the most common method used. These maintenance approaches offer higher reliability and increased safety to customers’ installed power products. ABB proposes risk and condition-based maintenance strategies to ensure maximum plant reliability.

Certified technicians
Maintenance is essential to keep equipment in the electrical network safe and reliable. It helps to eliminate workplace hazards. Lack of maintenance or inadequate maintenance can lead to dangerous situations, accidents, and can endanger asset and operator health. Maintenance is a high risk activity. It has to be performed correctly and safely.

ABB field service engineers and technicians are highly qualified and certified. This expertise, combined with long industry experience working on power equipment, makes them the best in class.

Choosing ABB as a partner for your maintenance needs provides the following advantages:
- High level of professionalism guaranteed by a continuous factory training process and refresher courses
- Instructions and maintenance schedules specific to each product
- Access to all technical information on the product and relative updates
- Rapid diagnosis thanks to specific testing instruments and identification of faults and/or not properly working equipment, thereby reducing plant downtimes
- Activities are conducted in complete safety in compliance with appropriate occupational health and safety management systems such as the OHSAS 18001 standard
- Release of an accurate maintenance intervention report

Preventative maintenance
Maintenance is carried out at predetermined intervals or according to prescribed criteria, aimed at reducing the failure risk or performance degradation of the equipment.

This method is based on scheduled activities performed on the out-of-service equipment including:
- Visual checks
- Apparatus cleaning
- Mechanical components lubrication
- Testing
- Worn parts replacement
- Functional tests execution

Maintenance cycles are planned according to the need to take the device out of service. The incidence of operating faults is reduced.
Risk-based maintenance
Maintenance is carried out based on the result of an asset assessment, which includes analysis, measurement and testing activities.

The gathered information is viewed in the context of the environmental, operation, and process condition of the equipment in the system and its importance. The aim is to perform the asset condition and risk assessment, and define the appropriate maintenance program.

All equipment displaying abnormal values is refurbished or replaced. This makes it possible to extend the useful life and guarantee higher levels of plant reliability, safety, and efficiency.

Condition-based maintenance
Maintenance is based on equipment performance monitoring and control of the corrective actions taken as a result.

The actual equipment condition is assessed by the on-line detection of significant working device parameters and their automatic comparison with average values and performance. Maintenance is carried out when certain indicators give the signal that the equipment is deteriorating and the failure probability is increasing.

This strategy, in the long term, drastically reduces costs associated with maintenance, minimizing the occurrence of serious faults, and optimizing available economic resources management.
Start-up and maintenance services
Maintenance - Testing

Medium voltage switchgear is the core component of distribution networks, industry plants, and power generation, and any internal failure may have a significant impact, mainly because restoration is complicated and lengthy.

Relay calibration
Relays are very sensitive equipment which require proper calibration, coordination, and of course, testing. Improper calibration can lead to either nuisance trips or an unprotected system if they are set too low or too high.

After a relay is commissioned, it is important to carry out regular relay calibration testing. One of the advantages of such testing is pinpointing a defective relay before it fails to act during a fault. It will also show where the power system needs to be adjusted, as many feeders and loads may have been added over the years, after the relay was installed.

Not every type of relay requires the same frequency of maintenance testing, however, it’s advised to have periodic maintenance tests on a yearly basis.

High Potential (Hi-pot)
The Hi-pot test, sometimes called a Dielectric Withstand test, is used to verify the strength of the insulation between a product’s current-carrying components and its chassis or enclosure. This is done by applying a high voltage from the mains-input lines to the chassis of the product and measuring the resulting leakage current flowing through its insulation. The theory: if a voltage much higher than the product would normally see is applied across the insulation without a breakdown, the product will be able to operate safely when run under nominal operating conditions.

The Hi-pot test is crucial because it is the best way to uncover workmanship and assembly defects in an electrical product that can lead to insulation breakdown.

Mistakes during assembly or faulty/damaged components exist to an extent in any installation environment, and the Hi-pot test can uncover units that are unfit and dangerous to operate.

In order to detect breakdown in electrical products, this test is usually performed after installation and recommended during routine repair and maintenance.

Partial Discharge (PD)
Failure of medium voltage switchgear insulation is the number one cause of system failures with IEEE statistics indicating that electrical insulation deterioration causes up to 90% of electrical failures. PD testing gives advance warning of pending insulation failure.

PD can occur in the form of cavity discharges and surface discharges. If allowed to continue, PD will erode the insulation, resulting in tracking or a tree-shaped pattern of deterioration eventually resulting in the complete breakdown and failure of the switchgear. To prevent these types of events in switchgear systems, PD monitoring on a regular basis is essential.

Data obtained through PD testing and monitoring can provide critical information regarding the quality of insulation and its impact on system health. By detecting and trending PD, it is possible to observe its development over time, in order to assist with decisions regarding the repair or replacement of affected assets.
Start-up and maintenance services

Maintenance - Refurbishment

Refurbishments are for circuit breakers with readily available parts. ABB's factory trained technicians provide refurbishment services for both nuclear and non-nuclear low and medium voltage circuit breakers.

ABB refurbishes used circuit breakers to like-new operating condition, providing a full one-year warranty covering parts and labor.

One Price refurbishment program
ABB offers an exclusive refurbishment program for ABB lineage circuit breakers. ABB will provide a complete circuit breaker refurbishment price, up front, that includes all standard parts normally replaced during breaker refurbishment.

One Price benefits
• No surprises - complete circuit breaker refurbishment price up front
• Includes all standard parts normally replaced during breaker refurbishment, plus specific additional components if they do not meet ABB acceptance standards
• Conditional on the circuit breaker being received in working condition, with no apparent damage found during the "as received" inspection
• Includes a one-year warranty and accompanying documentation

Other manufacturers’ circuit breakers
ABB has the expertise to refurbish other manufacturers’ used circuit breakers to like new operating condition. The refurbishment process is the same as that for ABB circuit breakers.

Base prices quoted cover typical refurbishment components and labor from qualified technicians. Other parts and repairs are performed based on additional quotations and customer approval.

ABB customer service solutions
In addition to providing excellent circuit breaker refurbishments, ABB works with customers to create refurbishment programs to meet specific needs and timeframes. Examples of customer service solutions include:
• Loaner/spare breakers for refurbishment rotation and minimized down time
• On-site refurbishments

Inspection
As received inspection

Disassembly
Cleaning of current carrying and non-current parts to remove all foreign materials

Inspection
Inspection of all parts for cracks and deterioration

Refurbishment
Replacing/repairing of parts to meet the original design life of the breaker

Reasembly
Reassembly of circuit breaker per assembly drawings and relubrication

Final testing
Final test as a new breaker in accordance with ANSI standards

Labeling
Each refurbished circuit breaker is labeled for traceability

Report
Test report is supplied with results from "as received" and "final" testing including list of replaced parts
Start-up and maintenance services

Repairs

Rely on ABB’s repair competencies and fast response to emergency situations, and unexpected or planned outages. Choose factory-approved repairs using parts manufactured to controlled specifications and in accordance with current design revision level.

Our nationwide network of service centers offer medium and low voltage product repairs either on site, or at our well-equipped local workshops.

Planned on-site repair
ABB technicians visit your site during a planned outage time. The technician will be trained and certified on the respective product and will arrive well-prepared, allowing the technician to repair the equipment in the minimum time possible.

Workshop repair
Besides on-site repair, workshop repair can be offered in our state-of-the-art service workshops. By utilizing our workshops, we can reach a higher range of repair that cannot always be achieved on site. Fundamental failures can be more easily detected and removed.

In addition to the repair work, the equipment will be fully tested in our testing facility and sent back to the customer with the accompanying documentation.

Emergency repairs
Factory-trained technicians are available 24 hours a day, 365 days a year to support emergency repairs.

Technicians also have the support of the ABB factories to provide necessary parts, drawings, and engineering guidance.

Based on deep product know-how and the availability of spare parts, unexpected outage times can be dramatically reduced.
Extended warranty through installation and commissioning

ABB offers an extended warranty to customers that purchase new ABB switchgear or retrofit solutions where installation and commissioning is done by ABB. The warranty extension is provided to the customer free-of-charge.

This warranty can be provided free-of-charge since experience has shown that risk of product failure in the first year trends towards 0% when ABB technicians handle installation and commissioning services.

This is a result of our continuous internal product training and recertification programs. As experience has shown, this low failure rate cannot be achieved by non-OEM service providers and independent service contractors.

Warranty of functionality

ABB offers a warranty of functionality for equipment that is being assessed/maintained in accordance with the associated Service Agreement contract (page 31) up to the next service interval according to ABB’s parameters (max. 3 years).

If anything happens to the equipment within that period of time, costs are covered by the warranty and ABB will repair or replace the affected covered product or component free-of-charge.

The warranty of functionality can be offered for a wide range of products associated with your electrical distribution network for any MV equipment installed, regardless of manufacturer and life cycle. Some exclusions apply, due to the condition of existing assets and availability of spare parts or replacement options for obsolete equipment.

The warranty of functionality is a unique approach in the market of Service Agreements and will enable you to plan your operational budget well in advance, with much more certainty.
Life cycle services
Engineering and consulting

Additional services are provided by ABB with a supportive function. In most cases these services are part of a larger project, but are critical for overall success.

System integration
System integration solutions find the most efficient and economical approach to the integration and application of ABB and other manufacturers’ equipment into a site installation. This includes identifying system protection requirements and the proper devices to provide system protection.

To ensure highest reliability, ABB also provides system reliability improvement studies involving the general analysis of an electrical power system to determine the cause of power system failures or reduced reliability. ABB will recommend configuration changes and additional equipment necessary to correct system failures and improve overall system reliability.

Engineering and consulting
Use ABB’s know-how to identify opportunities for improving system performance, optimizing your processes technically and economically - all while maintaining regulatory compliance.

Along with recommendations on product applications, ABB can develop and provide customized solutions that solve even the most complex of customer challenges.
Life cycle services
Engineering and consulting -
Power system studies

How do you know if your circuit breaker will work when called upon to interrupt an electrical fault or short-circuit? And what type of Personal Protective Equipment should your personnel be using?

Studies can provide the answers to those questions.

**Short circuit study**
Short circuit studies are usually performed when changes are made to an existing system, including the installation of new power equipment or the reconfiguration of existing equipment.

ABB has the expertise to provide these studies to ensure the proper coordination and protection settings related to the electrical equipment and system.

Short Circuit Analysis and Coordination Studies will test the configuration of your protective devices, including relays, switches, and circuit breakers. Proper function and coordination is necessary to prevent damage to equipment in the event of a fault.

The Short-Circuit Analysis and Coordination Study looks at loads at various points in the system and how they change after a simulated fault. Ideally, only the protective device closest to the fault will catch and clear it, minimizing the areas affected. This requires calibration of each device, as well as proper coordination between them.

**Arc flash study**
Arc flash studies reveal the incident energy of a potential arc flash event. These studies are performed to determine the necessary level of protective equipment or clothing to be worn by workers in close proximity to these potential arcs. These studies also help determine the proper application of any arc flash mitigation equipment to be installed.

Section 110.16 of the 2008 National Electrical Code requires that electrical equipment be marked to warn qualified personnel of potential arc flash hazards. In order to accurately evaluate the dangers associated with arc flash, we must quantify the hazard. The measure, which has been developed to assess arc flash events, is incident energy. This is the energy measured on a surface at a specified working distance from the arc flash location.

The result of the arc flash study will categorize the hazard at specific equipment based on the incident energy, as well as identify the Arc Flash Protection Boundary. Inside the Arc Flash Protection Boundary a worker must be wearing the proper clothing or PPE. The main objective of the PPE is to limit the burns to the body resulting from an arc flash event, to a survivable level.

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### Arc Flash and Shock Hazard Appropriate PPE Required

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<th>Hazard Type</th>
<th>Equipment</th>
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<td>3' - 4'</td>
<td>Flash Hazard Boundary</td>
<td>Cotton underwear plus FR shirt and FR pants</td>
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<tr>
<td>4' - 6'</td>
<td>2 Flash Hazard at 18 Inches</td>
<td>Cotton underwear plus FR shirt and FR pants</td>
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<tr>
<td>0.48</td>
<td>6' - 12'</td>
<td>Cotton underwear plus FR shirt and FR pants</td>
</tr>
<tr>
<td>3' - 6'</td>
<td>Restricted Approach - Class 00 Voltage Gloves</td>
<td>Cotton underwear plus FR shirt and FR pants</td>
</tr>
<tr>
<td>1' - 0'</td>
<td>Prohibited Approach - Class 00 Voltage Gloves</td>
<td>Cotton underwear plus FR shirt and FR pants</td>
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**WARNING**

**Equipment Name SWG-2A**

Life cycle services
Match-in-line/extension

Expanding an existing switchgear line-up by adding one or more feeder frames is commonly referred to as match-in-line. This technique is increasingly used to satisfy increased power demands.

ABB reproduce many of the heritage brand switchgear which is no longer in active production as both full line-ups or add-on frames for existing installations.

As the OEM, ABB can still manufacture switchgear types like HK, HKII and K-line to match the existing installed switchgear line-up. The newly manufactured cells are equipped with state-of-the-art components. ABB has the reference drawings and manufacturing capabilities to easily produce exact match expansion frames for ABB lineage designs.

Electrification Products Distribution Solutions Services controls both design and manufacturing of all interfaces and extensions, including bus work and protection and control panels. Field service technicians work with customers to install, connect, test, and commission the switchgear line-up or match-in-line/extension.

Benefits of match-in-line include:
- Maintain equipment, operating procedures, and safety standards
- Ensure consistent technical standards
- Optimization of spares and maintenance
- Breaker interchangeability
Life cycle services
Upgrades - safety improvements

There are rare cases where failure inside a medium voltage switchgear cabinet, due to a defect, exceptional service condition, or incorrect operation, can cause an internal arc – a short circuit current flowing through the air. This can create a significant hazard due to the instantaneous increase in temperatures at the fault location to around 20,000°C, well above the melting point of steel, copper, and insulation materials. Internal components are vaporized and the sudden release of heat and plasma (ionized gas) creates an explosive blast.

Maximum protection of all personnel during an arc fault is the number one priority. Approximately 75% of internal arcs occur with an operator working at, or standing in front of, the switchgear. On IAC (internal arc classified) switchgear, personal protection is fully accomplished by an integrated pressure relief system. On non-IAC switchgear, this passive protection is not given in full respect since heat and plasma can escape.

This significantly reduces personal safety on site, especially in cases where proper passive protection has not been integrated in the past. In those cases, all of the heat and plasma normally escape at the weakest point of the switchgear, which in many cases, happens to be the door.

Passive protection can increase personal safety, but it is advisable to take active measures to prevent such an event from happening in the first place. This not only eliminates risk to personnel, but also offers protection against damage and even destruction of system components. The consequential production outage of the plant often results in higher costs than the calculated project costs of the damaged switchgear.

Employee safety and reliable personnel risk prevention are the number one priority for ABB. For this reason, ABB provides a range of offerings to help its customers to address all safety elements:
- Arc flash relays
- Grounding devices
- Current limiting devices
- Remote racking
- Testing
- Studies
The REA system is a fast and flexible arc fault protection relay for air-insulated low voltage and medium voltage switchgear. A fast and selective arc fault protection system is a natural constituent of a modern switchgear panel and a safety and security investment for older switchgears to protect human lives and prevent or reduce asset damage.

The REA arc fault protection system uses two types of sensors for detecting light: a non-shielded, bare-fiber sensor that detects light along its entire length and light collecting lens sensors with typically one sensor installed per switchgear compartment.

The function of the REA arc fault protection system is based on detecting the intense light of an electric arc alone or on a detection of light and simultaneous phase or neutral overcurrent. On detection of an arc fault, the REA arc fault protection system delivers trip commands in less than 2.5 ms to all circuit breakers that feed the fault zone.

Furthermore, the operation indicators of the REA arc fault protection system help localize faults by selectively guiding the maintenance staff to the fault zone identified by the arc fault protection system.

The actual REA arc fault protection system consists of one or more arc fault protection main modules and a necessary number of extension modules. The main module can operate as a stand-alone device or cooperate with other main modules, as well as with the extension modules. The extension modules allow the number of sensor fibers and/or lens sensors to be increased to extend the area of protection.

The use of the extension modules including fast trip outputs will allow protection schemes with increased selectivity to be created.

The ABB REA arc protection system is widely used in aftermarket applications because of the increased personnel and property protection and the easy switchgear installation.

Medium voltage service field service technicians are trained to properly install, test, and commission the REA system.
Life cycle services
Upgrades - arc fault protection - ultra fast earthing switch (UFES)

The occurrence of an arc fault, the most serious fault within a switchgear system, is typically associated with extremely high thermal and mechanical stresses in the area concerned. A new, active arc fault protection system, based on the know-how gained from decades of experience with the ABB vacuum interrupter and \( I_s \)-limiter technology, now effectively helps to avoid these negative effects if a fault should occur.

The new active arc fault protection device for switchgear
The Ultra-Fast Earthing Switch (UFES) is a combination of devices consisting of an electronic tripping unit and the corresponding primary switching elements which initiate a three-phase short-circuit to ground in the event of a fault. The extremely short switching time of the primary switching element, less than 1.5 ms, in conjunction with the rapid and reliable detection of the fault, ensures that an arc fault is extinguished almost immediately after it arises (extinguishing time < 4 ms after detection).

This extension enables passive protected switchgear to achieve the highest possible level of protection for personnel and equipment.

Unbeatable advantages
- Highly increased system and process availability
- Highly increased operator safety for switchgear; especially during or after maintenance work
- Drastically reduced repair costs by minimizing the effects of faults on the system
- Minimization of pressure rise and gases in the faulty compartment and surrounding switchgear building

Avoid severe effects of an arc fault, such as:
- Extreme pressure
- Temperature rise up to 20,000 °C
- Burning/vaporization of metal and insulating material
- Release of substances and hot gases

The Ultra-Fast Earthing Switch eliminates the arc fault well before the first peak of the fault current. Example pressure curves, with and without UFES, in a compartment of an air-insulated medium voltage switchgear system with an internal arc fault current of 130 kA (peak) / 50 kA (rms). Primary switching element for one phase.
Life cycle services
Upgrades arc fault protection - remote racking

Maintaining a safe distance between personnel and equipment during critical operations provides the most effective means of avoiding injury by keeping people out of harm’s way. Remote racking provides a safer operating environment for personnel through the proven method of adding distance between the operator and arc flash incident energy at the switchgear site, bringing operation of power circuit breakers to a new level of safety.

The process of racking a circuit breaker into and out of the connected position is one of the most frequent exercises that expose an operator to risk. Increased focus on operator safety has caused owners to question the adequacy of prior switchgear designs that require the cell door to be open in order to connect or disconnect the primary circuit and the secondary control circuit. A malfunction during this operation has the potential for catastrophic consequences to equipment and personnel.

Supervised, closed-door circuit breaker racking is a fundamental recognized safety practice. Furthermore, older breakers are more complex and vulnerable to mechanical failures that create safety problems.

ABB can provide a portable external driver to be mounted on the switchgear door for remote racking. The system can be used with ABB, ITE heritage brands, as well as other manufacturer’s low and medium voltage switchgear and roll-in replacement solutions.

ABB can deliver fully-automated remote racking systems, remote breaker operation devices, and the necessary accessories.

During the installation and commissioning of the remote racking devices, our field service technicians will provide on-site training on functionality so that the customer’s service personnel feels comfortable in using the devices.
Life cycle services

Retrofit

Retrofit stands for the replacement of phased-out devices by components which are mechanically and electrically adapted for the existing engineering. Retrofitting is an optimal measure for subsequently upgrading older equipment in power transmission and distribution systems by integrating state-of-the-art components to achieve a clearly defined goal: maintaining a high level of availability and assuring the necessary safety standards at a minimum of cost.

Full-scale solutions from a single source
We offer our customers specialized expertise as a system provider for implementing optimized retrofit solutions for electrical substations. Thanks to our global and local experience, ABB is known for fast and competent implementation of retrofit projects.

Our services are also available for systems and devices which were originally provided by competitors, as well as for products whose manufacturers no longer exist. In addition, we can integrate a variety of supplementary services in order to create tailored full-scale solutions.

Have you thought about the following?
• Is fast supply of spare parts assured for your plant/system?
• How high is the risk that there will be production stoppages due to unexpected maintenance activities?
• Are you in a position to assure maximum safety for your operating staff?
• How can you enhance the productivity of your plant/system?

Busbar compartment
• Retrofitting the arc fault protection system UFES (Ultra Fast Earthing Switch)
• Retrofitting the busbar compartment-replacing parts of the insulating material
• Replacing asbestos sheets that pose health hazards by installing non-hazardous partition components

Cable connection compartment
• Retrofitting current transformers
• Replacing asbestos sheets that pose health hazards by installing non-hazardous partition components
• Retrofitting earthing switches

Low voltage compartment
• Retrofitting the protection relay
• Preventive maintenance (preventative testing and maintenance of the protection relay)
• Retrofitting the control facilities

Circuit breaker compartment
• Retrofitting the switchgear truck/circuit breaker
Life cycle services
Circuit breaker retrofit options

Circuit breaker retrofits are used to replace phased out devices by current production versions. They are mechanically and electrically engineered to adapt to the existing solution on site. ABB service experts conduct site audits on existing installations to assess the condition of equipment, recommend the proper solution, and support the right investment decision. Circuit breaker retrofits are a cost-effective switchgear modernization solution. The result is a noticeable improvement in safety, reliability, maintenance, and performance.

ABB is a full-system provider which includes:
• Site data collection
• Design
• Manufacturing
• Testing
• Installation and commissioning
With our expertise, both ABB and non-ABB equipment can be addressed.

Characteristics of the different technical solutions for retrofit:

Roll-in Replacement
• Only new components used
• The new truck carries a standard circuit breaker
• High performance and additional features
• Reduced downtime
• Fully type tested
• Plug and play solution

Hard bus retrofill
• Only new components used
• The new frame hosts a standard circuit breaker
• An additional power circuit makes the connection
• Existing bushings generally remain in place
Life cycle services
Circuit breaker retrofit – roll-in replacement

Based on long-time experience and know-how, ABB developed roll-in replacement retrofit solutions specially tailored to most existing limited and obsolete, floor rolling, medium voltage circuit breakers that were produced by ABB and other manufacturers. As a result, ABB can offer the opportunity to eliminate outdated air magnetic technology through the use of the latest vacuum interrupting technology. The result is a significant improvement in reliability, safety, maintenance, and performance.

The circuit breaker
ABB roll-in replacement solutions for technical outdated switching technologies are equipped with the state-of-the-art ABB vacuum circuit breaker, valued for outstanding quality and reliability.
- Equipped with embedded poles that guarantee process stability and quality
- Embedded poles provide optimum protection for the vacuum interrupter from moisture, dust and external damage
- Low maintenance magnetic operating mechanism or modular spring stored energy operating mechanism available

Standards and testing of roll-in replacement solutions
- Designed, built, and tested according to latest applicable ANSI standards
- Circuit breakers are type tested and each breaker undergoes full production testing
- Tested in a switchgear cell to ensure integrity and fit
- Nuclear certification available

Customization
All ABB roll-in replacement solutions are customized. This guarantees that the bushings and truck of the retrofit solution match the existing panel on the customer site and that only a short downtime for the exchange will be required.
- Built with all new parts
- Modification of the existing circuit breaker switchgear compartment is not typically necessary
- Switchgear interlocking safeguards are incorporated

Installation and commissioning
ABB field service engineers and technicians are the best-in-class option for installation and commissioning of a retrofit. Allowing ABB to perform or supervise the installation ensures a smooth project and provides an extended warranty to the customer.
Life cycle services
Circuit breaker retrofit – hard bus retrofit

It is a modernization process including replacement of the circuit breaker and some of the functional components of the switchgear power compartment. It is applicable where the existing switchgear frame is still in functional condition and may have faulty or defective interlocks, shutters, mechanism operated contacts, or truck operated contacts.

OneFit
OneFit is the latest ABB hard bus retrofill design concept, embedding an integrally safe plug-in technology to easily connect the new breaker to a wide range of existing panels.

OneFit is composed of a frame hosting the new circuit breaker. It is connected to the existing switchgear bushings by a copper adaptation system and an insulating shell, that also acts as inner interface with the new breaker.

This solution balances the need for a retrofill solution with reasonably limited site works and linked outage.

OneFit is fully tested to all relevant ANSI standards regarding switchgear modernization. ABB is the only service provider that can provide a fully pre-engineered and pre-tested hard bus retrofill solution.

1. Existing non-ABB panel
2. Copper adaptation system
3. Insulating shell
4. Insulating plate
5. Basement
6. Shutter
7. Frame
8. ABB new standard breaker
9. Front cover
Life cycle services
Relay retrofit

The reliability threat posed by aging electric power systems and the need to reduce operating costs increases the importance of protective relays in existing substations and power plants.

As the installed base of electromechanical protection and control relays continues to age and becomes more and more costly to support, replacement with up-to-date microprocessor-based relays becomes increasingly important.

Relay retrofit project
With a wide range of microprocessor-based protective relay systems, ABB is uniquely positioned to provide expert relay solutions due to a large installed base and long experience with different applications.

The diversity of different engineering designs and global development capabilities make ABB the most reliable partner for relay retrofit projects.

ABB provides customers with engineering and technical support in every aspect of system protection, from initial testing of existing relays to managing complete turnkey relay retrofit projects.

During a relay retrofit project, existing relay and control panels and doors are modified and retrofitted at the customer’s location. ABB replaces the outdated and technically obsolete relays in the existing panels with new microprocessor relays. ABB furnishes the necessary engineering, documentation, relay settings, and commissioning per customer requirements.

The whole exchange process can be accomplished within a short period of time, so only minimum downtime of the switchgear is required.

Testing and commissioning services
During the testing and commissioning, ABB verifies that the relay settings are correct and performs system functional tests to verify the integrity of the system. The relays are run through trip checks to make sure they pass acceptance testing.

After the testing, the system wiring is verified against as-built drawings and the whole project is completed with the delivery of documentation on findings, including test reports, to the customer.

Benefits of ABB relay retrofit solutions
• Advanced technology—upgrade to the latest capabilities in protection, control, metering, and fault recording
• Expanded communication capabilities—Relion series IEDs come standard with Modbus, DNP3.0, and IEC61850 GOOSE

Relay benefits:
• Installation time savings
• Wire-like-unit rear terminals exactly match old unit; no change at wire bundles
• Installation can be completed in as little as 40 minutes
• Form and fit the existing cutout
• Engineering time savings—save up to 70% of the time required to update existing drawings after the upgrade
Life cycle services
Replacement breakers

ABB provides continuous design improvements for heritage brand products. It continues to be our goal to protect customers’ investments beyond the factory manufacturing life cycles of products caught in this continuous evolution.

ABB continues sales for heritage brand products until an equivalent or better product is available. It is the intention of ABB to continually support heritage brand products - as long as there are significant customer requirements - by making replacement breakers available. ABB has all the updated drawings and can provide the engineering support to insure customers get exactly the breaker which is needed based on the original configurations. Exceptions to this may occur if components or technologies required for products are no longer available to ABB.

Circuit breakers ABB supports as new legacy are:
- K-Line
- HK
- VH
- VHKX
Condition-based maintenance is one of the best service approaches for the electrical system, guaranteeing high uptime, immediate response, focused maintenance, and reduced life cycle costs. MyRemoteCare is the remote condition monitoring system supporting this concept.

Condition-based maintenance guarantees maintenance process optimization by providing a root cause analysis of the asset condition and suggesting proper maintenance actions.

ABB experts take care of the equipment thanks to MyRemoteCare, providing correction of failures either before they occur or before they develop into major defects.

The most important benefits of MyRemoteCare condition monitoring are:

- Reduced unscheduled downtime and operational costs
- Increased asset availability and linked production

MyRemoteCare enables the maintenance and operation teams to have continuous supervision of the circuit breaker conditions, alarms (sent as text message to an operator), events, and performance trends. ABB service engineers analyze this data and define the proper maintenance, at the right time, for each asset.

This allows maintenance to be planned only when it is required, reducing the need for purely schedule-based maintenance activities.

With MyRemoteCare, the following information characteristics are continuously monitored:

- Opening/closing time
- Closing signaling contact quality
- Position error
- Number of operations and fault current operations
- Inactivity timer
- Operating mechanism springs charging time
- Operating mechanism springs failure to attempt
- Circuit breaker compartment air temperature
- Auxiliary voltage quality
- Power contacts wear (Ikt)
Assessments help to evaluate the condition and assess the reliability of your electrical network equipment, in order to mitigate asset risks. Knowing and improving the condition of the equipment is a key factor in reducing the likelihood of failure, damage, and injury, and offers the possibility to move from a time-based to a reliability-centered maintenance approach.

Knowing the condition of the installed equipment, and where to spend the operational budget to grow reliability, is an issue of increasing importance in today’s electrical network operations due to the aging installed base.

MySiteCondition is the ABB methodology to support the decision by assessing:
- Importance of the equipment
- Actual site condition
- Critical points in the network
- Available historical data
- Operator and asset safety

After the assessment is conducted, the collected data is carefully analyzed and factored by an engineered algorithm technique to evaluate the risks and consequences of a failure.

The outcomes of the assessment are detailed reports and illustrations which explain and visualize the actual status of the overall plant condition and each asset, and how performance and safety can be improved by prioritizing maintenance needs.

The documented and transparent decision making framework provided by MySiteCondition supports operators in the risk-based maintenance approach in times where know-how is decreasing, and switchgear line-ups are reaching a critical age.

The assumption that all assets are fit for the future can be a dangerous gamble.

The identification of increased future risk and the mitigating effect of various intervention strategies is mandatory information for a safe and reliable operation.
ABB specializes in products, systems, and service solutions which help to improve productivity and availability of customers’ plants, while also reducing operational costs. With increasing competition, customers concentrate more on their core businesses and leave operation, maintenance, and refurbishment of their electrical system assets to qualified partners.

**PowerCare – your maintenance contract for MV equipment**

PowerCare is the most convenient and efficient way of ensuring medium and low voltage equipment availability and reliability.

ABB provides a choice of different service packages with customizable agreements to suit your company’s needs. PowerCare is a predefined framework, based on different service levels and types, and packaged to fit each customer’s unique requirements.

Services range from an entry level 24/7 hotline and a single point of contact for asset assessments and preventive maintenance, including warranty of functionality, to high level diagnosis and remote monitoring services.

With this unique service approach, ABB can assure a continuous dialog with you regarding asset optimization throughout the entire life cycle. On a regular basis, ABB is supporting you in developing future-based service strategies with the aim of a long lifetime for your installed power products.

**Have you ever asked yourself?**

- If you have a direct contact who knows your equipment in case of an emergency?
- If your future service costs are projectable?
- If there is a competent partner who is taking the full liability and responsibility on your equipment after the maintenance work was performed and offers a functionality warranty?
- If unplanned outages can be reduced by proactive measures?
- If the manufacturer of your switchgear is available anytime?
- If you have a reliable on-site service partner available?

### PowerCare Basic

- 24/7 emergency hotline
- Personal contact
- Contractually guaranteed reaction times
  - Callback of specialist within one hour
  - On-site failure recording within ten hours
  - On-site troubleshooting within 24 hours
- Reduced hourly emergency rates

### PowerCare Plus

- PowerCare Basic
- Contractually guaranteed reaction times
  - Callback of specialist within one hour
  - On-site failure recording within ten hours
  - Online access to ABB’s personalized PowerCare portal
- Technical support
  - HelpDesk support
  - Troubleshooting by phone
- Inspection
  - Inspection of the equipment covered in the contract

### PowerCare Advanced

- PowerCare Basic
- PowerCare Plus
- Warranty of functionality
  - Assessment and maintenance of the equipment covered by the contract
  - Warranty of functionality of covered equipment up to the next service interval according to ABB’s parameters (max 3 years)
- Testing
  - Relay calibration / testing (optional)
- Discounted service offerings
  - Retrofit

### PowerCare Excellence

- PowerCare Basic
- PowerCare Plus
- PowerCare Advanced
- 24/7 spare parts delivery
- Remote monitoring
- On-site safety analysis
- Further customer requests
  - Project driven
Additional information

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